Título: IMPACT OF EXERCISE AND BIOACTIVE INGREDIENTS ON NOVEL CARDIOMETABOLIC RISK MARKERS AND ENERGY METABOLISM

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Resumen: Obesity and cardiometabolic disease rates are increasing across young and middle-aged adults. This situation calls for the identification and implementation of novel cardiometabolic risk (CMR) markers for identifying individuals at higher risk of developing cardiometabolic diseases and establishing adequate prevention and treatment strategies. In this regard, exercise interventions and the use of bioactive ingredients are both promising strategies to combat obesity and cardiometabolic diseases.

The present International Doctoral Thesis aimed to evaluate the impact of exercise on novel CMR markers (Section I) and the impact of bioactive compounds and exercise on energy metabolism (Section II). Findings from the studies included in Section I revealed that plasma succinate levels might be a promising novel CMR

marker in young, sedentary adults (Study I). However, succinate levels were not modified after a 24-week of an exercise training program (Study I). We also studied the effects of acute endurance and resistance exercise on plasma levels of plasma bile acids (BA), which have been also proposed as novel CMR factors in young adults (Study II). This study demonstrated that plasma levels of BA rapidly decreases after a bout of endurance and resistance exercise in an exercise-type specific manner in young, sedentary adults. Remarkably, those individuals with higher cardiorespiratory fitness levels showed a unique response of unconjugated primary BA 120 min after endurance exercise that seems to be reflective of their better health status in comparison to their low cardiorespiratory fitness levels counterparts (Study II). Studies from Section II concluded that the level of evidence on the use of bioactive ingredients to activate brown adipose tissue (BAT) and to promote white adipose tissue (WAT) browning in healthy humans is weak and scarce (Study III). Nevertheless, there is strong scientific evidence from rodent models that supports the use bioactive ingredients to activate BAT and promote WAT browning and thus to potentially combat obesity and cardiometabolic disorders (Study IV). Finally, in Study V we evaluated the effect of 12 mg of dihydrocapsiate during endurance exercise on energy metabolism, showing that the ingestion of dihydrocapsiate does not increase energy expenditure or fat oxidation during endurance exercise in men with overweight/obesity.

In summary, the present International Doctoral Thesis provides new insights into the impact of acute and long terms effects of exercise on the circulating levels of novel CMR markers. Furthermore, the use of bioactive ingredients is a promising strategy to activate BAT in individuals with obesity and cardiometabolic diseases, while their beneficial effects during exercise remains to be further explored.